

High-Definition Multimedia Interface

Version 2.0

Quantum Data MOI v1.0

Test ID: HF1-18

June 16, 2014

Preface

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Document Revision History

1.0 June 16, 2014 - Initial Release.

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Contact Information

The URL for the HDMI Forum web site is: <http://www.hdmiforum.org/>

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Introduction

This document provides a set of Method of Implementation for test method described in HDMI Compliance Test Specification Version 2.0 (HDMI CTS 2.0). HDMI Forum created HDMI CTS 2.0 to specify a set of tests that should be performed to verify features described in HDMI Specification Version 2.0.

Scope

This document provides testing procedures for HDMI CTS 2.0 Test ID HF1-18: Source AVI InfoFrame and GCP – 6G – 2160p.” The procedure below deals with single resolution and only one Test ID is considered at a time.

References

Normative References

High-Definition Multimedia Interface Specification Version 1.4b, October 11, 2011.
HDMI Compliance Test Specification Version 1.4b, October 11, 2011.
High-Definition Multimedia Interface Specification Version 2.0, August, 2013.
HDMI Compliance Test Specification Version 2.0.

Informative Reference

No additional informative references.

Test ID HF1-18: Source AVI InfoFrame and GCP – 6G – 2160p

Objective

Confirm that the Source, whenever transmitting any 2160p Video Format for TMDS Character Rate above 340Mcsc up to 600Mcsc, transmits an accurate AVI InfoFrame at least once per every two video fields and appropriate color depth as indicated by GCP.

Table 7-89 Source AVI InfoFrame and GCP - 6G – Requirements

Reference	Requirement
[HDMI: 2.0: 7.2.2] BT.2020 Colorimetry	<See reference for details>
[HDMI 2.0: 10.1] Use of the AVI InfoFrame in This Specification	<See reference for details>

Capability(s)

The Source DUT supports any Video Format/color mode for TMDS Character Rate above 340Mcsc up to 600Mcsc.

Test Equipment

Item	Generic Equipment	Vendor Specific Equipment	Quantity
1	HDMI 2.0 Protocol Analyzer	980 Advanced Test Platform series: 980 HDMI 2.0 Protocol Analyzer module HDMI CTS 2.0 Compliance Test Package #3	1

Generic Procedure

- 1 If the CDF field Source_Above_340 is “N”, then SKIP this test.
(NOTE: Testing of 48 bits/Pixel mode is not covered by this test. If the Source DUT supports both 30 and 36 bits/Pixel modes of a Video Format, then testing of 30 bits/Pixel mode is optional for ATC Testing).Setup:
- 2 Connect the Source DUT to the Protocol Analyzer.
- 3 Configure the EDID, which indicates all Video Formats necessary for this test.
Measure:
- 4 For each Video Timing listed in CDF field Source_2160p_Video_Formats_Above_340, Source_2160p_DC_Video_Formats_Above_340, and Source_2160p_3D_Video_Formats_Above_340, perform the following:
 - 4.1 Operate the Source DUT to output the tested format.

- 4.2 Capture and descramble the data (except for one unscrambled Control Period per field) and verify the tested format as follows:
- [Verify that at least one AVI InfoFrame is transmitted within every two video fields]
- 4.3 If the AVI InfoFrame does not occur at least once per two Video Fields, then FAIL.
- [Verify each field of the AVI InfoFrame Packet]
- 4.4 If an AVI InfoFrame is transmitted and HB1 [InfoFrame_version] is not equal to 2, then FAIL.
- 4.5 If the Source DUT is outputting any one of the following formats:
- 3840x2160p 29.97, 30Hz (HDMI_VIC = 1) at a color depth of 30/36 bits/Pixel.
 - 3840x2160p 25Hz (HDMI_VIC = 2) at a color depth of 30/36 bits/Pixel.
 - 3840x2160p 23.98, 24Hz (HDMI_VIC = 3) at a color depth of 30/36 bits/Pixel.
 - 4096x2160p 23.98, 24Hz (HDMI_VIC = 4) at a color depth of 30/36 bits/Pixel.
- 4.5.1 If the transmitted AVI InfoFrame [VIC] is not 0x00, then FAIL.
- 4.6 If the Source DUT is outputting any other format:
- 4.6.1 If the VIC field, in the transmitted AVI InfoFrame, does not correspond to one of the video identification codes, corresponding to the transmitted Video Timing, then FAIL.
- 4.7 If PB1 bit 7 is not equal to 0, then FAIL.
- 4.8 If PB4 bit 7 is not equal to 0, then FAIL.
- 4.9 If any byte PB14 to PB27 is not equal to 0, then FAIL.
- [Verify ITU-R BT.2020 content transmission function]
- 5 If the CDF field Source_ITURBT_2020_101 is "Y" then:
- 5.1 Configure the EDID with a Colorimetry Data Block including indication of ITU-RBT.2020 Y'CC'BCC'RC colorimetry (byte #3 = 0x20).
- 5.2 Operate the Source DUT to output ITU-R BT.2020 Y'CC'BCC'RC content signal.
- 5.3 If the AVI InfoFrame does not occur at least once per two Video Fields, then FAIL.
- 5.4 In the transmitted AVI InfoFrame:
- 5.4.1 If the fields C1 and C0 do not indicate Extended Colorimetry (1,1), then FAIL.
- 5.4.2 If the fields EC2, EC1 and EC0 do not indicate ITU-R BT.2020 Y'CC'BCC'RC (1,0,1), then FAIL.
- 5.4.3 If Y2,Y1,Y0 indicates Y'C'BCC'RC 4:4:4 (0,1,0) is used, then check the transmitted GCP (HB0 = 0x03) as follows:

- 5.4.3.1 If SB1 [CD3,CD2,CD1,CD0] does not indicate either 30-bit (0101b), 36-bit (0110b), or 48-bit (0111b), then FAIL.
 - 5.5 Configure the EDID with a Colorimetry Data Block including no support for colorimetry (byte #3 = 0).
 - 5.6 Operate the Source DUT to output ITU-R BT.2020 Y'CC'BCC'RC content signal.
 - 5.7 If any video field containing an AVI InfoFrame with fields C1 and C0 indicating Extended Colorimetry (1,1), then FAIL.
- 6 If the CDF field Source_ITURBT_2020_110 is "Y" then:
 - 6.1 Configure the EDID with a Colorimetry Data Block including indication of ITU-R BT.2020 R'G'B' and Y'C'BC'R colorimetry (byte #3 = 0xC0).
 - 6.2 Operate the Source DUT to output ITU-R BT.2020 R'G'B' or Y'C'BC'R content signal.
 - 6.3 If the AVI InfoFrame does not occur at least once per two Video Fields, then FAIL.
 - 6.4 In the transmitted AVI InfoFrame:
 - 6.4.1 If the fields C1 and C0 do not indicate Extended Colorimetry (1,1), then FAIL.
 - 6.4.2 If the fields EC2, EC1 and EC0 do not indicate ITU-R BT.2020 R'G'B' or Y'C'BC'R (1,1,0), then FAIL.
 - 6.4.3 If Y2,Y1,Y0 indicates ITU-R BT.2020 R'G'B' (0,0,0) or Y'C'BC'R 4:4:4 (0,1,0) is used, then check the transmitted GCP (HB0 = 0x03) as follows:
 - 6.4.3.1 If SB1[CD3,CD2,CD1,CD0] does not indicate either 30-bit (0101b),36-bit (0110b), or 48-bit (0111b), then FAIL.
 - 6.5 Configure the EDID with a Colorimetry Data Block including no support for colorimetry (byte #3 = 0).
 - 6.6 Operate the Source DUT to output ITU-R BT.2020 R'G'B' or Y'C'BC'R content signal.
 - 6.7 If any video field containing an AVI InfoFrame with fields C1 and C0 indicating Extended Colorimetry (1,1), then FAIL.

Vendor Specific Test Procedure

Test Equipment

A variety of equipment is needed for testing HDMI products. Each piece is authorized and included by name in this Compliance Test Specification. This section describes the Quantum Data test equipment.

HDMI 2.0 Protocol Analyzer module

The Quantum Data 980 HDMI 2.0 Protocol Analyzer module can be installed in the 980B or 980R series Advanced Test Platforms. This 980 HDMI 2.0 Protocol Analyzer module serves the generic test functions called out in the HDMI 2.0 Generic CTS. Refer to the table below:

Item	Quantum Data Equipment	
1	980 Advanced Test Platform series:	
	Equipped with:	980 HDMI 2.0 Protocol Analyzer module
		HDMI CTS 2.0 Compliance Test Package #3

980 HDMI 2.0 Protocol Analyzer Module with 980 Series Platform Configurations

The figures below show depictions of the 980 HDMI 2.0 Protocol Analyzer module equipped in various 980 series platforms. **Note:** Card positioning may vary depending on configuration.



AVI InfoFrame and GCP – 6G – 2160p

Test ID HF1-18: Source AVI InfoFrame and GCP – 6G – 2160p

1. Objective

Confirm that the Source, whenever transmitting any 2160p Video Format for TMDS Character Rate above 340Mcsc up to 600Mcsc, transmits an accurate AVI InfoFrame at least once per every two video fields and appropriate color depth as indicated by GCP.

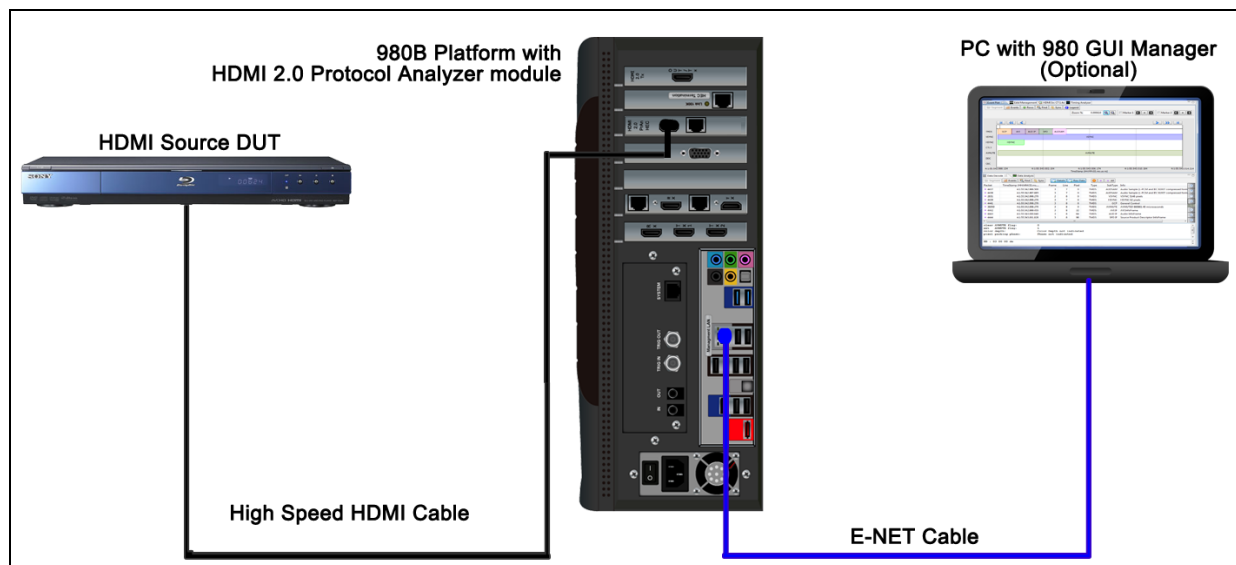
2. Test Overview

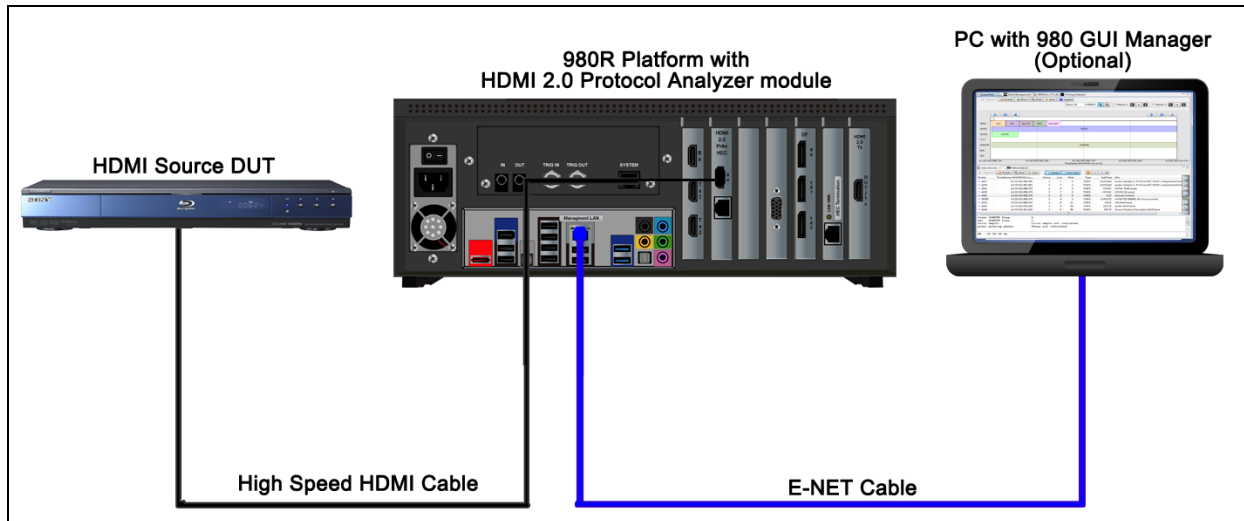
The Pass/Fail criteria is assessed by the application with no human examination required.

3. Procedure

Use the following procedure to conduct this test.

- 1 Connect Source DUT to the Quantum Data 980 HDMI 2.0 Protocol Analyzer at the module's port labeled Rx. Use a High Speed HDMI cable. The figures below show depictions of connections to the 980 HDMI 2.0 Protocol Analyzer module residing in the 980 series chassis.

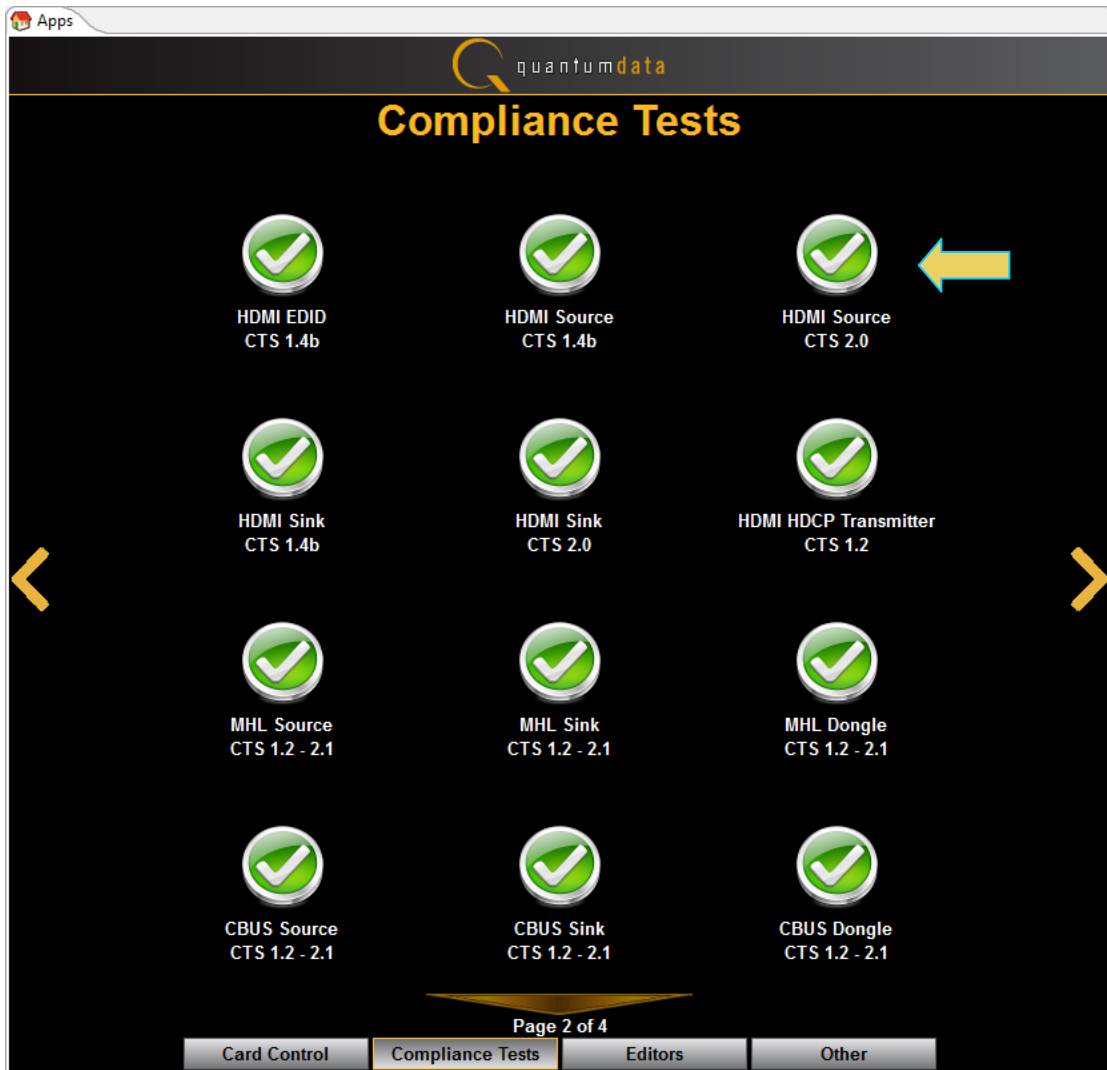




- 2 Operate the Source DUT to output the supported 3D formats.
- 3 Use Quantum Data 980 Embedded Manager GUI (touchscreen) or invoke Quantum Data 980 External Manager GUI (Windows application).

Note: You will not need to connect the PC shown in the figures above if you are running the compliance test through the 980's embedded display. The PC running the 980 HDMI Protocol Analyzer module's compliance test application is connected to the 980 through a standard Ethernet cable.

- 4 Complete the following steps:
 - 4.1 Click on the HDMI Source CTS 2.0 icon in the Compliance Tests page of the Apps panel.



- 4.2 Navigate to the CDF tab if not already there. If there is a saved CDF file, then click on Open and select it. Otherwise, enter the DUT's CDF information for each tab and optionally click on Save to save the CDF.

HDMI 2.0 Src CT 2.0

CDF Entry Test Selection Test Options / Preview

Open New Save CDF File: /CDF/XYZ_Source

General Y420 Video 21:9 (64:27) Video 6G Video 50p Timings

Source_ITURBT_2020_101 Does the DUT support ITU-R BT.2020 Y'CC'BCC'RC Colorimetry?
☐ Yes ☒ No

Source_ITURBT_2020_110 Does the DUT support ITU-R BT.2020 Y'C'BC'R Colorimetry?
☐ Yes ☒ No

Source_LTE_340Msc_Scrambling Does the product support scrambling for TMDS Character Rates at or below 340Msc?
☐ Yes ☒ No

Source_Above_340 Does the product support any Video Format/color mode for TMDS Character Rate above 340Msc up to 600Msc?
☒ Yes ☐ No

Source_2160p_Video_Formats_Above_340

(96) 3840x2160p @ 50 Hz 16:9	<input checked="" type="radio"/> Yes <input type="radio"/> No
(97) 3840x2160p @ 60 Hz 16:9	<input checked="" type="radio"/> Yes <input type="radio"/> No
(101) 4096x2160p @ 50 Hz 256:135	<input type="radio"/> Yes <input checked="" type="radio"/> No
(102) 4096x2160p @ 60 Hz 256:135	<input type="radio"/> Yes <input checked="" type="radio"/> No
(106) 3840x2160p @ 50 Hz 64:27	<input checked="" type="radio"/> Yes <input type="radio"/> No
(107) 3840x2160p @ 60 Hz 64:27	<input checked="" type="radio"/> Yes <input type="radio"/> No

Source_2160p_DC_Video_Formats_Above_340

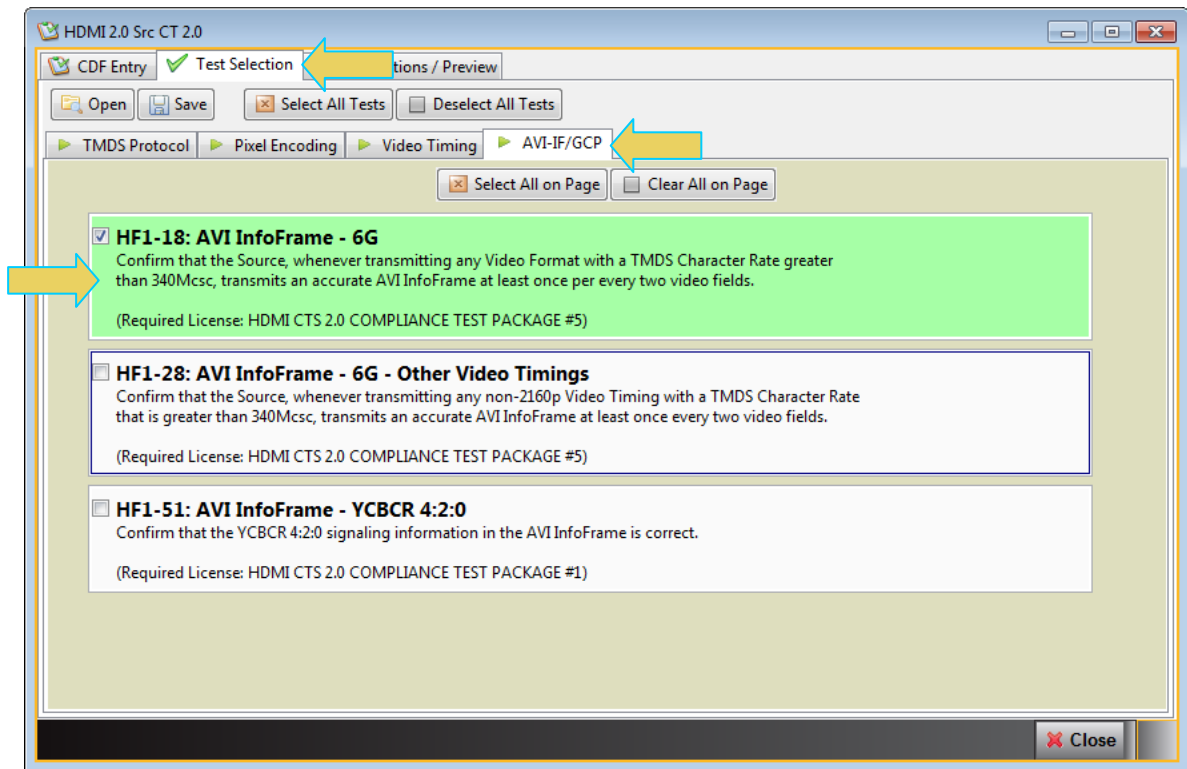
	<input checked="" type="checkbox"/> 30	<input checked="" type="checkbox"/> 36	<input type="checkbox"/> 48	(bits per pixel)
(93) 3840x2160p @ 24 Hz 16:9	<input checked="" type="checkbox"/> 30	<input checked="" type="checkbox"/> 36	<input type="checkbox"/> 48	(bits per pixel)
(94) 3840x2160p @ 25 Hz 16:9	<input checked="" type="checkbox"/> 30	<input checked="" type="checkbox"/> 36	<input type="checkbox"/> 48	(bits per pixel)
(95) 3840x2160p @ 30 Hz 16:9	<input checked="" type="checkbox"/> 30	<input checked="" type="checkbox"/> 36	<input type="checkbox"/> 48	(bits per pixel)
(98) 4096x2160p @ 24 Hz 256:135	<input type="checkbox"/> 30	<input type="checkbox"/> 36	<input type="checkbox"/> 48	(bits per pixel)
(99) 4096x2160p @ 25 Hz 256:135	<input type="checkbox"/> 30	<input type="checkbox"/> 36	<input type="checkbox"/> 48	(bits per pixel)
(100) 4096x2160p @ 30 Hz 256:135	<input type="checkbox"/> 30	<input type="checkbox"/> 36	<input type="checkbox"/> 48	(bits per pixel)
(103) 3840x2160p @ 24 Hz 64:27	<input type="checkbox"/> 30	<input type="checkbox"/> 36	<input type="checkbox"/> 48	(bits per pixel)
(104) 3840x2160p @ 25 Hz 64:27	<input type="checkbox"/> 30	<input type="checkbox"/> 36	<input type="checkbox"/> 48	(bits per pixel)
(105) 3840x2160p @ 30 Hz 64:27	<input type="checkbox"/> 30	<input type="checkbox"/> 36	<input type="checkbox"/> 48	(bits per pixel)

Source_2160p_3D_Video_Formats_Above_340

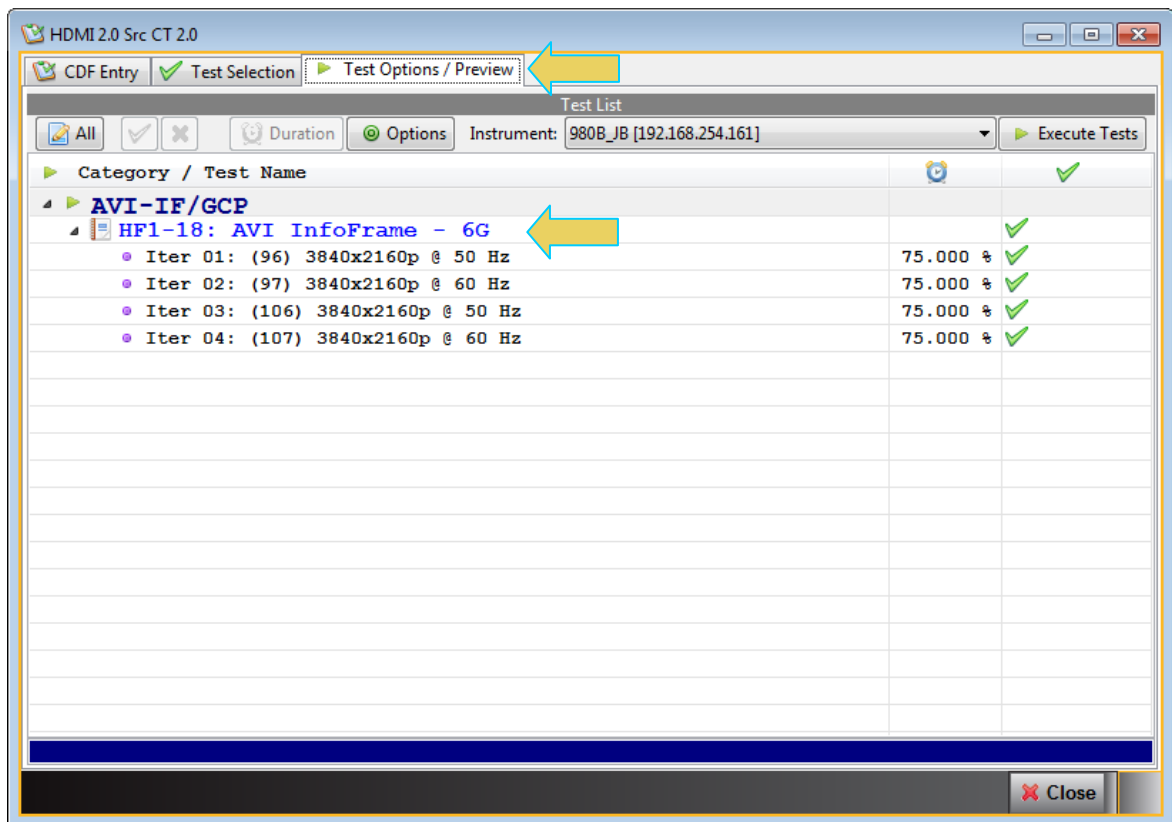
(95) 3840x2160p @ 30 Hz 16:9 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(94) 3840x2160p @ 25 Hz 16:9 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(93) 3840x2160p @ 24 Hz 16:9 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(98) 4096x2160p @ 24 Hz 256:135 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(100) 4096x2160p @ 30 Hz 256:135 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(99) 4096x2160p @ 25 Hz 256:135 - Frame Packing	<input type="radio"/> Yes <input checked="" type="radio"/> No
(97) 3840x2160p @ 60 Hz 16:9 - Side-by-Side (Half)	<input checked="" type="radio"/> Yes <input type="radio"/> No
(96) 3840x2160p @ 50 Hz 16:9 - Side-by-Side (Half)	<input checked="" type="radio"/> Yes <input type="radio"/> No

Close

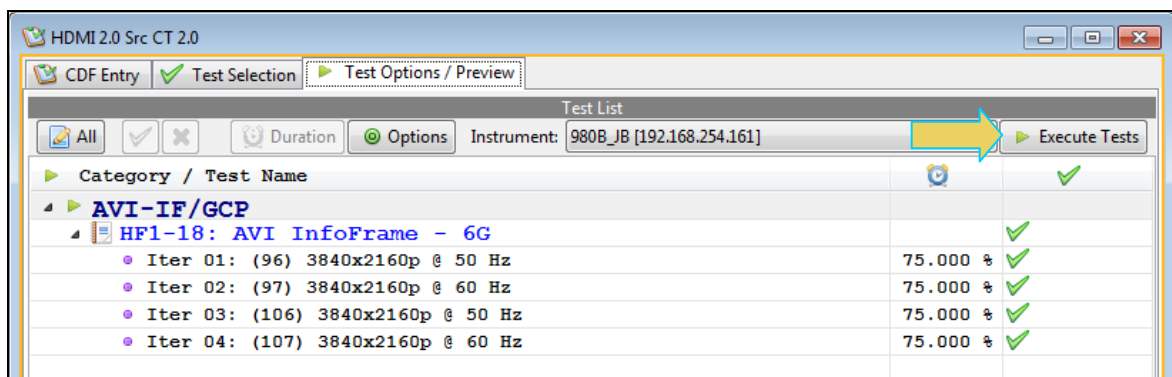
- 4.3 Click on the Test Selection tab and the Video Timing sub tab and select the Test ID HF1-18: Source AVI InfoFrame and GCP – 6G – 2160p Test. Refer to the sample screen below.



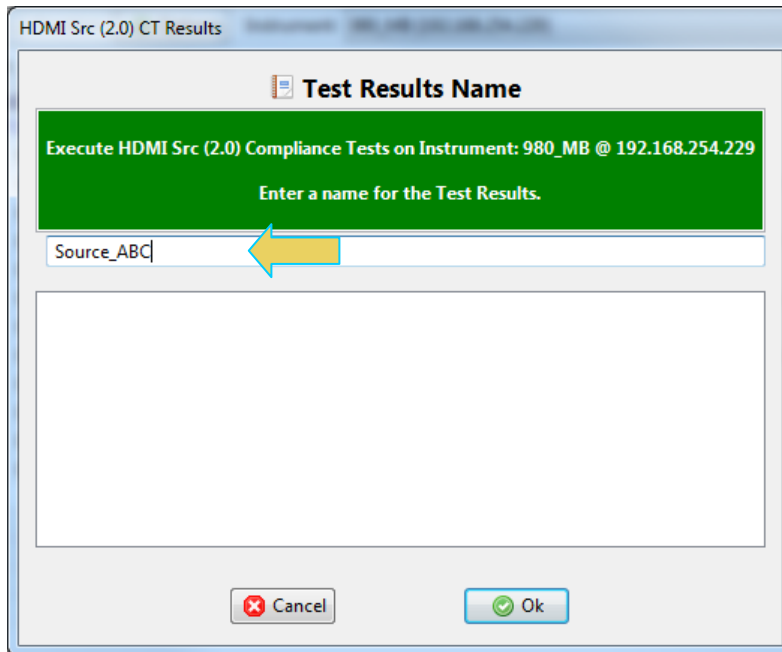
- 4.4 Click on Test Options / Preview tab and review the list of tests. Refer to the sample screen below.



4.5 Click on Execute tests activation button to initiate the test. Refer to the sample screen below.



Note: You will be prompted with a dialog box to assign a name to the test results. Refer to the screen example below:



Enter a name, click OK and the test will begin.

A Test Window will appear (below) indicating the progress of the test.

You will be prompted with a dialog box informing you of the requirements of the source DUT. Verify that the source is outputting the required HDMI format and pixel encoding and press Continue to run the test.

- 5 If the 980 HDMI Protocol Analyzer's compliance test application reports PASS, then PASS.
If the 980 HDMI Protocol Analyzer's compliance test application reports FAIL, then FAIL.

Compliance Test Results Viewer

HDMI 2.0 Src (2.0) Compliance Test Results

Results Name: HF1-18-06
Date Tested: May 21, 2014 9:23 AM
Overall Status: CTS 2.0 - Pass

Manufacturer: Quantum Data
Model Name: 882EA-1
Port Tested: Output 1

HTML Report

Test Results

Test Name / Details		Status
HF1-18: AVI InfoFrame - 6G		Pass
Iter 01: (96) 3840x2160p @ 50 Hz	75.000 %	Pass
Iter 02: (97) 3840x2160p @ 60 Hz	75.000 %	Pass
Iter 03: (101) 4096x2160p @ 50 Hz	75.000 %	Pass
Iter 04: (102) 4096x2160p @ 60 Hz	75.000 %	Pass
Iter 05: (106) 3840x2160p @ 50 Hz	75.000 %	Pass
Iter 06: (107) 3840x2160p @ 60 Hz	75.000 %	Pass
Iter 07: (93) 3840x2160p @ 24 Hz, DC - 36 bpp	75.000 %	Pass
Iter 08: (94) 3840x2160p @ 25 Hz, DC - 36 bpp	75.000 %	Pass
Iter 09: (95) 3840x2160p @ 30 Hz, DC - 36 bpp	75.000 %	Pass
Iter 10: (98) 4096x2160p @ 24 Hz, DC - 36 bpp	75.000 %	Pass
Iter 11: (99) 4096x2160p @ 25 Hz, DC - 36 bpp	75.000 %	Pass
Iter 12: (100) 4096x2160p @ 30 Hz, DC - 36 bpp	75.000 %	Pass
Iter 13: (103) 3840x2160p @ 24 Hz, DC - 36 bpp	75.000 %	Pass
Iter 14: (104) 3840x2160p @ 25 Hz, DC - 36 bpp	75.000 %	Pass
Iter 15: (105) 3840x2160p @ 30 Hz, DC - 36 bpp	75.000 %	Pass
Iter 16: (95) 3840x2160p @ 30 Hz, 3D - Frame Packing	75.000 %	Pass
Iter 17: (94) 3840x2160p @ 25 Hz, 3D - Frame Packing	75.000 %	Pass

Open Capture

Instrument: 980B_JB [192.168.254.161]

Continue Test Execution

Close